THE THIRD TEMPLE'S HOLY OF HOLIES: ISRAEL'S NUCLEAR WEAPONS

by

Warner D. Farr, LTC, U.S. Army

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Abstract

This paper is a history of the Israeli nuclear weapons program drawn from a review of unclassified sources. Israel began its search for nuclear weapons at the inception of the state in 1948. As payment for Israeli participation in the Suez Crisis of 1956, France provided nuclear expertise and constructed a reactor complex for Israel at Dimona capable of large-scale plutonium production and reprocessing. The United States discovered the facility by 1958 and it was a subject of continual discussions between American presidents and Israeli prime ministers. Israel used delay and deception to at first keep the United States at bay, and later used the nuclear option as a bargaining chip for a consistent American conventional arms supply. After French disengagement in the early 1960s, Israel progressed on its own, including through several covert operations, to project completion. Before the 1967 Six-Day War, they felt their nuclear facility threatened and reportedly assembled several nuclear devices. By the 1973 Yom Kippur War Israel had a number of sophisticated nuclear bombs, deployed them, and considered using them. The Arabs may have limited their war aims because of their knowledge of the Israeli nuclear weapons. Israel has most probably conducted several nuclear bomb tests. They have continued to modernize and vertically proliferate and are now one of the world's larger nuclear powers. Using "bomb in the basement" nuclear opacity, Israel has been able to use its arsenal as a deterrent to the Arab world while not technically violating American nonproliferation requirements.

The Third Temple's Holy of Holies:
Israel's Nuclear Weapons

Warner D. Farr

I. Introduction

This is the end of the Third Temple.

– Attributed to Moshe Dayan

during the Yom Kippur War[1]

As Zionists in Palestine watched World War II from their distant sideshow, what lessons were learned? The soldiers of the Empire of Japan vowed on their emperor's sacred throne to fight to the death and not face the inevitability of an American victory. Many Jews wondered if the Arabs would try to push them into the Mediterranean Sea. After the devastating American nuclear attack on Japan, the soldier leaders of the empire reevaluated their fight to the death position. Did the bomb give the Japanese permission to surrender and live? It obviously played a military role, a political role, and a peacemaking role. How close was the mindset of the Samurai culture to the Islamic culture? Did David Ben-Gurion take note and wonder if the same would work for Israel?[2] Could Israel find the ultimate deterrent that would convince her opponents that they could never, ever succeed? Was Israel's ability to cause a modern holocaust the best way to guarantee never having another one?

The use of unconventional weapons in the Middle East is not new. The British had used chemical artillery shells against the Turks at the second battle of Gaza in 1917. They continued chemical shelling against the Shiites in Iraq in 1920 and used aerial chemicals in the 1920s and 1930s in Iraq.[3]

Israel's involvement with nuclear technology starts at the founding of the state in 1948. Many talented Jewish scientists immigrated to Palestine during the thirties and forties, in particular, Ernst David Bergmann. He would become the director of the Israeli Atomic Energy Commission and the founder of Israel's efforts to develop nuclear weapons. Bergmann, a close friend and advisor of Israel's first Prime Minister, David Ben-Gurion, counseled that nuclear energy could compensate for Israel's poor natural resources and small pool of military manpower. He pointed out that there was just one nuclear energy, not two, suggesting nuclear weapons were part of the plan.[4] As early as 1948, Israeli scientists actively explored the Negev Desert for uranium deposits on orders from the Israeli Ministry of Defense. By 1950, they found low-grade deposits near Beersheba and Sidon and worked on a low power method of heavy water production.[5]

The newly created Weizmann Institute of Science actively supported nuclear research by 1949, with Dr. Bergmann heading the chemistry division. Promising students went overseas to study nuclear engineering and physics at Israeli government expense. Israel secretly founded its own Atomic Energy Commission in 1952 and placed it under the control of the Defense Ministry.[6] The foundations of a nuclear program were beginning to develop.

II. 1948-1962: With French Cooperation

It has always been our intention to develop a nuclear potential.

– Ephraim Katzir[7]

In 1949, Francis Perrin, a member of the French Atomic Energy Commission, nuclear physicist, and friend of Dr. Bergmann visited the Weizmann Institute. He invited Israeli scientists to the new French nuclear research facility at Saclay. A joint research effort was subsequently set up between the two nations. Perrin publicly stated in 1986 that French scientists working in America on the Manhattan Project and in Canada during World War II were told they could use their knowledge in France provided they kept it a secret.[8] Perrin reportedly provided nuclear data to Israel on the same basis.[9] One Israeli scientist worked at the U.S. Los Alamos National Laboratory and may have directly brought expertise home.[10]

After the Second World War, France's nuclear research capability was quite limited. France had been a leading research center in nuclear physics before World War II, but had fallen far behind the U.S., the U.S.S.R., the United Kingdom, and even Canada. Israel and France were at a similar level of expertise after the war, and Israeli scientists could make significant contributions to the French effort. Progress in nuclear science and technology in France and Israel remained closely linked throughout the early fifties. Israeli scientists probably helped construct the G-1 plutonium production reactor and UP-1 reprocessing plant at Marcoule.[11] France profited from two Israeli patents on heavy water production and low-grade uranium enrichment.[12] In the 1950s and into the early 1960s, France and Israel had close relations in many areas. France was Israel's principal arms supplier, and as instability spread through French colonies in North Africa, Israel provided valuable intelligence obtained from contacts with sephardic Jews in those countries.

The two nations collaborated, with the United Kingdom, in planning and staging the Suez Canal-Sinai operation against Egypt in October 1956. The Suez Crisis became the real genesis of Israel's nuclear weapons production program. With the Czech-Egyptian arms agreement in 1955, Israel became worried. When absorbed, the Soviet-bloc equipment would triple Egyptian military strength. After Egypt's President Nasser closed the Straits of Tiran in 1953, Israeli Prime Minister Ben-Gurion ordered the development of chemical munitions and other unconventional munitions, including nuclear.[13] Six weeks before the Suez Canal operation, Israel felt the time was right to approach France for assistance in building a nuclear reactor. Canada had set a precedent a year earlier when it had agreed to build a 40-megawatt CIRUS reactor in India. Shimon Peres, the Director-General of the Defense Ministry and aide to Prime Minister (and Defense Minister) David Ben-Gurion, and Bergmann met with members of the CEA (France's Atomic Energy Commission). During September 1956, they reached an initial understanding to provide a research reactor. The two countries concluded final agreements at a secret meeting outside Paris where they also finalized details of the Suez Canal operation.[14]

For the United Kingdom and France, the Suez operation, launched on October 29, 1956, was a total disaster. Israel's part was a military success, allowing it to occupy the entire Sinai Peninsula by 4 November, but the French and British canal invasion on 6 November was a political failure. Their attempt to advance south along the Suez Canal stopped due to a cease-fire under fierce Soviet and U.S. pressure. Both nations pulled out, leaving Israel to face the pressure from the two superpowers alone. Soviet Premier Bulganin and President Khrushchev issued an implicit threat of nuclear attack if Israel did not withdraw from the Sinai.

On 7 November 1956, a secret meeting was held between Israeli foreign minister Golda Meir, Shimon Peres, and French foreign and defense ministers Christian Pineau and Maurice Bourges-Manoury. The French, embarrassed by their failure to support their ally in the operation, found the Israelis deeply concerned about a Soviet threat. In this meeting, they substantially modified the initial understanding beyond a research reactor. Peres secured an agreement from France to assist Israel in developing a nuclear deterrent. After further months of negotiation, agreement was reached for an 18-megawatt (thermal) research reactor of the EL-3 type, along with plutonium separation technology. France and Israel signed the agreement in October 1957.[15] Later the reactor was officially upgraded to 24 megawatts, but the actual specifications issued to engineers provided for core cooling ducts sufficient for up to three times this power level, along with a plutonium plant of similar capacity. Data from insider reports revealed in 1986 would estimate the power level at 125-150 megawatts.[16] The reactor, not connected to turbines for power production, needed this increase in size only to increase its plutonium production. How this upgrade came about remains unknown, but Bourges-Maunoury, replacing Mollet as French prime minister, may have contributed to it.[17] Shimon Peres, the guiding hand in the Israeli nuclear program, had a close relationship with Bourges-Maunoury and probably helped him politically.[18]

Why was France so eager to help Israel? DeMollet and then de Gaulle had a place for Israel within their strategic vision. A nuclear Israel could be a counterforce against Egypt in France's fight in Algeria. Egypt was openly aiding the rebel forces there. France also wanted to obtain the bomb itself. The United States had embargoed certain nuclear enabling computer technology from France. Israel could get the technology from America and pass it through to France. The U.S. furnished Israel heavy water, under the Atoms for Peace program, for the small research reactor at Soreq. France could use this heavy water. Since France was some years away from nuclear testing and success, Israeli science was an insurance policy in case of technical problems in France's own program.[19] The Israeli intelligence community's knowledge of past French (especially Vichy) anti-Semitic transgressions and the continued presence of former Nazi collaborators in French intelligence provided the Israelis with some blackmail opportunities.[20] The cooperation was so close that Israel worked with France on the preproduction design of early Mirage jet aircraft, designed to be capable of delivering nuclear bombs.[21]

French experts secretly built the Israeli reactor underground at Dimona, in the Negev desert of southern Israel near Beersheba. Hundreds of French engineers and technicians filled Beersheba, the biggest town in the Negev. Many of the same contractors who built Marcoule were involved. SON (a French firm) built the plutonium separation plants in both France and Israel. The ground was broken for the EL-102 reactor (as it was known to France) in early 1958.

Israel used many subterfuges to conceal activity at Dimona. It called the plant a manganese plant, and rarely, a textile plant. The United States by the end of 1958 had taken pictures of the project from U-2 spy planes, and identified the site as a probable reactor complex. The concentration of Frenchmen was also impossible to hide from ground observers. In 1960, before the reactor was operating, France, now under the leadership of de Gaulle, reconsidered and decided to suspend the project. After several months of negotiation, they reached an agreement in November that allowed the reactor to proceed if Israel promised not to make nuclear weapons and to announce the project to the world. Work on the plutonium reprocessing plant halted. On 2 December 1960, before Israel could make announcements, the U.S. State Department issued a statement that Israel had a secret nuclear installation. By 16 December, this became public knowledge with its appearance in the *New York Times*. On 21 December, Ben-Gurion announced that Israel was building a 24-megawatt reactor "for peaceful purposes."[22]

Over the next year, relations between the U.S. and Israel became strained over the Dimona reactor. The U.S. accepted Israel's assertions at face value publicly, but exerted pressure privately. Although Israel allowed a cursory inspection by well known American physicists Eugene Wigner and I. I. Rabi, Prime Minister Ben-Gurion consistently refused to allow regular international inspections. The final resolution between the U.S. and Israel was a commitment from Israel to use the facility for peaceful purposes, and to admit an U.S. inspection team twice a year. These inspections began in 1962 and continued until 1969. Inspectors saw only the above ground part of the buildings, not the many levels underground and the visit frequency was never more than once a year. The above ground areas had simulated control rooms, and access to the underground areas was kept hidden while the inspectors were present. Elevators leading to the secret underground plutonium reprocessing plant were actually bricked over.[23] Much of the information on these inspections and the political maneuvering around it has just been declassified.[24]

One interpretation of Ben-Gurion's "peaceful purposes" pledge given to America is that he interpreted it to mean that nuclear weapon development was not excluded if used strictly for defensive, and not offensive purposes. Israel's security position in the late fifties and early sixties was far more precarious than now. After three wars, with a robust domestic arms industry and a reliable defense supply line from the U.S., Israel felt much more secure. During the fifties and early sixties a number of attempts by Israel to obtain security guarantees from the U.S. to place Israel under the U.S. nuclear umbrella like NATO or Japan, were unsuccessful. If the U.S. had conducted a forward-looking policy to restrain Israel's proliferation, along with a sure defense agreement, we could have prevented the development of Israel's nuclear arsenal.

One common discussion in the literature concerns testing of Israeli nuclear devices. In the early phases, the amount of collaboration between the French and Israeli nuclear weapons design programs made testing unnecessary. In addition, although their main efforts were with plutonium, the Israelis may have amassed enough uranium for gun-assembled type bombs which, like the Hiroshima bomb, require no testing. One expert postulated, based on unnamed sources, that the French nuclear test in 1960 made two nuclear powers not one—such was the depth of collaboration.25 There were several Israeli observers at the French nuclear tests and the Israelis had "unrestricted access to French nuclear test explosion data."[26] Israel also supplied essential technology and hardware.[27] The French reportedly shipped reprocessed plutonium back to Israel as part of their repayment for Israeli scientific help.

However, this constant, decade long, French cooperation and support was soon to end and Israel would have to go it alone.

III. 1963-1973: Seeing the Project to Completion

To act in such a way that the Jews who died in the gas chambers would be the last Jews to die without defending themselves.

– Golda Meir[28]

Israel would soon need its own, independent, capabilities to complete its nuclear program. Only five countries had facilities for uranium enrichment: the United States, the Soviet Union, the United Kingdom, France, and China. The Nuclear Materials and Equipment Corporation, or NUMEC, in Apollo, Pennsylvania was a small fuel rod fabrication plant. In 1965, the U.S. government accused Dr. Zalman Shapiro, the corporation president, of "losing" 200 pounds of highly enriched uranium. Although investigated by the Atomic Energy

Commission, the Central Intelligence Agency, the Federal Bureau of Investigation, and other government agencies and inquiring reporters, no answers were available in what was termed the Apollo Affair.[29] Many remain convinced that the Israelis received 200 pounds of enriched uranium sometime before 1965.[30] One source links Rafi Eitan, an Israeli Mossad agent and later the handler of spy Jonathan Pollard, with NUMEC.[31] In the 1990s when the NUMEC plant was disassembled, the Nuclear Regulatory Commission found over 100 kilograms of plutonium in the structural components of the contaminated plant, casting doubt on 200 pounds going to Israel.[32]

The joint venture with France gave Israel several ingredients for nuclear weapons construction: a production reactor, a factory to extract plutonium from the spent fuel, and the design. In 1962, the Dimona reactor went critical; the French resumed work on the underground plutonium reprocessing plant, and completed it in 1964 or 1965. The acquisition of this reactor and related technologies was clearly intended for military purposes from the outset (not "dual-use"), as the reactor has no other function. The security at Dimona (officially the Negev Nuclear Research Center) was particularly stringent. For straying into Dimona's airspace, the Israelis shot down one of their own Mirage fighters during the Six-Day War. The Israelis also shot down a Libyan airliner with 104 passengers, in 1973, which had strayed over the Sinai.[33] There is little doubt that some time in the late sixties Israel became the sixth nation to manufacture nuclear weapons. Other things they needed were extra uranium and extra heavy water to run the reactor at a higher rate. Norway, France, and the United States provided the heavy water and "Operation Plumbat" provided the uranium.

After the 1967 war, France stopped supplies of uranium to Israel. These supplies were from former French colonies of Gabon, Niger, and the Central Africa Republic.[34] Israel had small amounts of uranium from Negev phosphate mines and had bought some from Argentina and South Africa, but not in the large quantities supplied by the French. Through a complicated undercover operation, the Israelis obtained uranium oxide, known as yellow cake, held in a stockpile in Antwerp. Using a West German front company and a high seas transfer from one ship to another in the Mediterranean, they obtained 200 tons of yellow cake. The smugglers labeled the 560 sealed oil drums "Plumbat," which means lead, hence "Operation Plumbat."[35] The West German government may have been involved directly but remained undercover to avoid antagonizing the Soviets or Arabs.[36] Israeli intelligence information on the Nazi past of some West German officials may have provided the motivation.[37]

Norway sold 20 tons of heavy water to Israel in 1959 for use in an experimental power reactor. Norway insisted on the right to inspect the heavy water for 32 years, but did so only once, in April 1961, while it was still in storage barrels at Dimona. Israel simply promised that the heavy water was for peaceful purposes. In addition, quantities much more than what would be required for the peaceful purpose reactors were imported. Norway either colluded or at the least was very slow to ask to inspect as the International Atomic Energy Agency (IAEA) rules required.[38] Norway and Israel concluded an agreement in 1990 for Israel to sell back 10.5 tons of the heavy water to Norway. Recent calculations reveal that Israel has used two tons and will retain eight tons more.[39]

Author Seymour Hersh, writing in the *Samson Option* says Prime Minister Levi Eshkol delayed starting weapons production even after Dimona was finished.[40] The reactor operated and the plutonium collected, but remained unseparated. The first extraction of plutonium probably occurred in late 1965. By 1966, enough plutonium was on hand to develop a weapon in time for the Six-Day War in 1967. Some type of non-nuclear test, perhaps a zero yield or implosion test, occurred on November 2, 1966. After this time, considerable collaboration between Israel and South Africa developed and continued through the 1970s and 1980s. South Africa became Israel's primary supplier of uranium for Dimona. A Center for Nonproliferation Studies report lists four separate Israel-South Africa "clandestine nuclear deals." Three concerned yellowcake and one was tritium.[41] Other sources of yellowcake may have included Portugal.[42]

Egypt attempted unsuccessfully to obtain nuclear weapons from the Soviet Union both before and after the Six-Day War. President Nasser received from the Soviet Union a questionable nuclear guarantee instead and declared that Egypt would develop its own nuclear program.[43] His rhetoric of 1965 and 1966 about preventive war and Israeli nuclear weapons coupled with overflights of the Dimona rector contributed to the tensions that led to war. The Egyptian Air Force claims to have first overflown Dimona and recognized the existence of a nuclear reactor in 1965.[44] Of the 50 American HAWK antiaircraft missiles in Israeli hands, half ringed Dimona by 1965.[45] Israel considered the Egyptian overflights of May 16, 1967 as possible pre-strike reconnaissance. One source lists such Egyptian overflights, along with United Nations peacekeeper withdrawal and Egyptian troop movements into the Sinai, as one of the three "tripwires" which would drive Israel to war.[46] There was an Egyptian military plan to attack Dimona at the start of any war but Nasser vetoed it.[47] He believed Israel would have the bomb in 1968.[48] Israel assembled two nuclear bombs and ten days later went to war.[49] Nasser's plan, if he had one, may have been to gain and consolidate territorial gains before Israel had a nuclear option.[50] He was two weeks too late.

The Israelis aggressively pursued an aircraft delivery system from the United States. President Johnson was less emphatic about nonproliferation than President Kennedy-or perhaps had more pressing concerns, such as Vietnam. He had a long history of both Jewish friends and pressing political contributors coupled with some first hand experience of the Holocaust, having toured concentration camps at the end of World War II.[51] Israel pressed him hard for aircraft (A-4E Skyhawks initially and F-4E Phantoms later) and obtained agreement in 1966 under the condition that the aircraft would not be used to deliver nuclear weapons. The State Department attempted to link the aircraft purchases to continued inspection visits. President Johnson overruled the State Department concerning Dimona inspections.[52] Although denied at the time, America delivered the F-4Es, on September 5, 1969, with nuclear capable hardware intact.[53]

The Samson Option states that Moshe Dayan gave the go-ahead for starting weapon production in early 1968, putting the plutonium separation plant into full operation. Israel began producing three to five bombs a year. The book *Critical Mass* asserts that Israel had two bombs in 1967, and that Prime Minister Eshkol ordered them armed in Israel's first nuclear alert during the Six-Day War.[54] Avner Cohen in his recent book, *Israel and the Bomb*, agrees that Israel had a deliverable nuclear capability in the 1967 war. He quotes Munya Mardor, leader of Rafael, the Armament Development Authority, and other unnamed sources, that Israel "cobbled together" two deliverable devices.[55]

Having the bomb meant articulating, even if secretly, a use doctrine. In addition to the "Samson Option" of last resort, other triggers for nuclear use may have included successful Arab penetration of populated areas, destruction of the Israeli Air Force, massive air strikes or chemical/biological strikes on Israeli cities, and Arab use of nuclear weapons.[56]

In 1971, Israel began purchasing krytrons, ultra high-speed electronic switching tubes that are "dual-use," having both industrial and nuclear weapons applications as detonators. In the 1980s, the United States charged an American, Richard Smith (or Smyth), with smuggling 810 krytrons to Israel.[57] He vanished before trial and reportedly lives outside Tel Aviv. The Israelis apologized for the action saying that the krytrons were for medical research.[58] Israel returned 469 of the krytrons but the rest, they declared, had been destroyed in testing conventional weapons. Some believe they went to South Africa.[59] Smyth has also been reported to have been involved in a 1972 smuggling operation to obtain solid rocket fuel binder compounds for the Jericho II missile and guidance component hardware.[60] Observers point to the Jericho missile itself as proof of a nuclear capability as it is not suited to the delivery of conventional munitions.[61]

On the afternoon of 6 October 1973, Egypt and Syria attacked Israel in a coordinated surprise attack, beginning the Yom Kippur War. Caught with only regular forces on duty, augmented by reservists with a low readiness level, Israeli front lines crumbled. By early afternoon on 7 October, no effective forces were in the southern Golan Heights and Syrian forces had reached the edge of the plateau, overlooking the Jordan River. This crisis brought Israel to its second nuclear alert.

Defense Minister Moshe Dayan, obviously not at his best at a press briefing, was, according to *Time* magazine, rattled enough to later tell the prime minister that "this is the end of the third temple," referring to an impending collapse of the state of Israel. "Temple" was also the code word for nuclear weapons. Prime Minister Golda Meir and her "kitchen cabinet" made the decision on the night of 8 October. The Israelis assembled 13 twenty-kiloton atomic bombs. The number and in fact the entire story was later leaked by the Israelis as a great psychological warfare tool. Although most probably plutonium devices, one source reports they were enriched uranium bombs. The Jericho missiles at Hirbat Zachariah and the nuclear strike F-4s at Tel Nof were armed and prepared for action against Syrian and Egyptian targets. They also targeted Damascus with nuclear capable long-range artillery although it is not certain they had nuclear artillery shells.[62]

U.S. Secretary of State Henry Kissinger was notified of the alert several hours later on the morning of 9 October. The U.S. decided to open an aerial resupply pipeline to Israel, and Israeli aircraft began picking up supplies that day. Although stockpile depletion remained a concern, the military situation stabilized on October 8th and 9th as Israeli reserves poured into the battle and averted disaster. Well before significant American resupply had reached Israeli forces, the Israelis counterattacked and turned the tide on both fronts.

On 11 October, a counterattack on the Golan broke the back of Syria's offensive, and on 15 and 16 October, Israel launched a surprise crossing of the Suez Canal into Africa. Soon the Israelis encircled the Egyptian Third Army and it was faced with annihilation on the east bank of the Suez Canal, with no protective forces remaining between the Israeli Army and Cairo. The first U.S. flights arrived on 14 October.[63] Israeli commandos flew to Fort Benning, Georgia to train with the new American TOW anti-tank missiles and return with a C-130 Hercules aircraft full of them in time for the decisive Golan battle. American commanders in Germany depleted their stocks of missiles, at that time only shared with the British and West Germans, and sent them forward to Israel.[64]

Thus started the subtle, opaque use of the Israeli bomb to ensure that the United States kept its pledge to maintain Israel's conventional weapons edge over its foes.[65] There is significant anecdotal evidence that Henry Kissinger told President of Egypt, Anwar Sadat, that the reason for the U.S. airlift was that the Israelis were close to "going nuclear."[66]

A similar Soviet pipeline to the Arabs, equally robust, may or may not have included a ship with nuclear weapons on it, detected from nuclear trace emissions and shadowed by the Americans from the Dardanelles. The Israelis believe that the Soviets discovered Israeli nuclear preparations from COSMOS satellite photographs and decided to equalize the odds.[67] The Soviet ship arrived in Alexandria on either 18 or 23 October (sources disagree), and remained, without unloading, until November 1973. The ship may have represented a Soviet guarantee to the Arab combatants to neutralize the Israeli nuclear option.[68] While some others dismiss the story completely, the best-written review article concludes that the answer is "obscure." Soviet premier Leonid Brezhnev threatened, on 24 October, to airlift Soviet airborne troops to reinforce the Egyptians cut off on the eastern side of the Suez Canal and put seven Soviet airborne divisions on alert.[69] Recent evidence indicates that the Soviets sent nuclear missile submarines also.[70] *Aviation Week and Space Technology* magazine claimed that the two Soviet SCUD brigades deployed in Egypt each had a nuclear warhead. American satellite photos seemed to confirm this. The U.S. passed to Israel images of trucks, of the type used to transport nuclear warheads, parked near the launchers.[71] President Nixon's response was to bring the U.S. to worldwide nuclear alert the next day, whereupon Israel went to nuclear alert a third time.[72] This sudden crisis quickly faded as Prime Minister Meir agreed to a cease-fire, relieving the pressure on the Egyptian Third Army.

Shimon Peres had argued for a pre-war nuclear demonstration to deter the Arabs. Arab strategies and war aims in 1967 may have been restricted because of a fear of the Israeli "bomb in the basement," the undeclared nuclear option. The Egyptians planned to capture an eastern strip next to the Suez Canal and then hold. The Syrians did not aggressively commit more forces to battle or attempt to drive through the 1948 Jordan River border to the Israeli center. Both countries seemed not to violate Israel proper and avoided triggering one of the unstated Israeli reasons to employ nuclear weapons.[73] Others discount any Arab planning based on nuclear capabilities.[74] Peres also credits Dimona with bringing Anwar Sadat to Jerusalem to make peace.[75] This position was seemingly confirmed by Sadat in a private conversation with Israeli Defense Minister Ezer Weizman.[76]

At the end of the Yom Kippur War (a nation shaking experience), Israel has her nuclear arsenal fully functional and tested by a deployment. The arsenal, still opaque and unspoken, was no longer a secret, especially to the two superpowers, the United States and the Soviet Union.

IV. 1974-1999: Bringing the Bomb up the Basement Stairs

Never Again!

– Reportedly welded on the
first Israeli nuclear bomb[77]

Shortly after the 1973 war, Israel allegedly fielded considerable nuclear artillery consisting of American 175 mm and 203 mm self-propelled artillery pieces, capable of firing nuclear shells. If true, this shows that Dimona had rapidly solved the problems of designing smaller weapons since the crude 1967 devices. If true, these low yield, tactical nuclear artillery rounds could reach at least 25 miles. The Israeli Defense Force did have three battalions of the 175mm artillery (36 tubes), reportedly with 108 nuclear shells and more for the 203mm tubes. Some sources describe a program to extend the range to 45 miles. They may have offered the South Africans these low yield, miniaturized, shells described as, "the best stuff we got."[78] By 1976, according to one unclassified source, the Central Intelligence Agency believed that the Israelis were using plutonium from Dimona and had 10 to 20 nuclear weapons available.[79]

In 1972, two Israeli scientists, Isaiah Nebenzahl and Menacehm Levin, developed a cheaper, faster uranium enrichment process. It used a laser beam for isotope separation. It could reportedly enrich seven grams of Uranium 235 sixty percent in one day.[80] Sources later reported that Israel was using both centrifuges and lasers to enrich uranium.[81]

Questions remained regarding full-scale nuclear weapons tests. Primitive gun assembled type devices need no testing. Researchers can test non-nuclear components of other types separately and use extensive computer simulations. Israel received data from the 1960 French tests, and one source concludes that Israel accessed information from U.S. tests conducted in the 1950s and early 1960s. This may have included both boosted and thermonuclear weapons data.[82] Underground testing in a hollowed out cavern is difficult to detect. A West Germany Army Magazine, *Wehrtechnik*, in June 1976, claimed that Western reports documented a 1963 underground test in the Negev. Other reports show a test at Al-Naqab, Negev in October 1966.[83]

A bright flash in the south Indian Ocean, observed by an American satellite on 22 September 1979, is widely believed to be a South Africa-Israel joint nuclear test. It was, according to some, the third test of a neutron bomb. The first two were hidden in clouds to fool the satellite and the third was an accident—the weather cleared.[84] Experts differ on these possible tests. Several writers report that the scientists at Los Alamos National Laboratory believed it to have been a nuclear explosion while a presidential panel decided otherwise.[85] President Carter was just entering the Iran hostage nightmare and may have easily decided not to alter 30 years of looking the other way.[86] The explosion was almost certainly an Israeli bomb, tested at the invitation of the South Africans. It was more advanced than the "gun type" bombs developed by the South Africans.[87] One report claims it was a test of a nuclear artillery shell.[88] A 1997 Israeli newspaper quoted South African deputy foreign minister, Aziz Pahad, as confirming it was an Israeli test with South African logistical support.[89]

Controversy over possible nuclear testing continues to this day. In June 1998, a Member of the Knesset accused the government of an underground test near Eilat on May 28, 1998. Egyptian "nuclear experts" had made similar charges. The Israeli government hotly denied the claims.[90]

Not only were the Israelis interested in American nuclear weapons development data, they were interested in targeting data from U.S. intelligence. Israel discovered that they were on the Soviet target list. American-born Israeli spy Jonathan Pollard obtained satellite-imaging data of the Soviet Union, allowing Israel to target accurately Soviet cities. This showed Israel's intention to use its nuclear arsenal as a deterrent political lever, or retaliatory capability against the Soviet Union itself. Israel also used American satellite imagery to plan the 7 June 1981 attack on the Tammuz-1 reactor at Osiraq, Iraq. This daring attack, carried out by eight F-16s accompanied by six F-15s punched a hole in the concrete reactor dome before the reactor began operation (and just days before an Israeli election). It delivered 15 delay-fused 2000 pound bombs deep into the reactor structure (the 16th bomb hit a nearby hall). The blasts shredded the reactor and blew out the dome foundations, causing it to collapse on the rubble. This was the world's first attack on a nuclear reactor.[91]

Since 19 September 1988, Israel has worked on its own satellite recon- naissance system to decrease reliance on U.S. sources. On that day, they launched the Offeq-1 satellite on the Shavit booster, a system closely related to the Jericho-II missile. They launched the satellite to the west away from the Arabs and against the earth's rotation, requiring even more thrust. The Jericho-II missile is capable of sending a one ton nuclear payload 5,000 kilometers. Offeq-2 went up on 3 April 1990. The launch of the Offeq-3 failed on its first attempt on 15 September 1994, but was successful 5 April 1995.[92]

Mordechai Vanunu provided the best look at the Israeli nuclear arsenal in 1985 complete with photographs.[93] A technician from Dimona who lost his job, Vanunu secretly took photographs, immigrated to Australia and published some of his material in the *London Sunday Tim*es. He was subsequently kidnapped by Israeli agents, tried and imprisoned. His data shows a sophisticated nuclear program, over 200 bombs, with boosted devices, neutron bombs, F-16 deliverable warheads, and Jericho warheads.[94] The boosted weapons shown in the Vanunu photographs show a sophistication that inferred the requirement for testing.[95] He revealed for the first time the underground plutonium separation facility where Israel was producing 40 kilograms annually, several times more than previous estimates. Photographs showed sophisticated designs which scientific experts say enabled the Israelis to build bombs with as little as 4 kilograms of plutonium. These facts have increased the estimates of total Israeli nuclear stockpiles (see Appendix A).[96] In the words of one American, "[the Israelis] can do anything we or the Soviets can do."[97] Vanunu not only made the technical details of the Israeli program and stockpile public but in his wake, Israeli began veiled official acknowledgement of the potent Israeli nuclear deterrent. They began bringing the bomb up the basement stairs if not out of the basement.

Israel went on full-scale nuclear alert again on the first day of Desert Storm, 18 January 1991. Seven SCUD missiles were fired against the cities of Tel Aviv and Haifa by Iraq (only two actually hit Tel Aviv and one hit Haifa). This alert lasted for the duration of the war, 43 days. Over the course of the war, Iraq launched around 40 missiles in 17 separate attacks at Israel. There was little loss of life: two killed directly, 11 indirectly, with many structures damaged and life disrupted.[98] Several supposedly landed near Dimona, one of them a close miss.[99] Threats of retaliation by the Shamir government if the Iraqis used chemical warheads were interpreted to mean that Israel intended to launch a nuclear strike if gas attacks occurred. One Israeli commentator recommended that Israel should signal Iraq that "any Iraqi action against Israeli civilian populations, with or without gas, may leave Iraq without Baghdad."[100] Shortly before the end of the war the Israelis tested a "nuclear capable" missile which prompted the United States into intensifying its SCUD hunting in western Iraq to prevent any Israeli response.[101] The Israeli Air Force set up dummy SCUD sites in the Negev for pilots to practice on—they found it no easy task.[102] American government concessions to Israel for not attacking (in addition to Israeli Patriot missile batteries) were:

- Allowing Israel to designate 100 targets inside Iraq for the coalition to destroy,
- Satellite downlink to increase warning time on the SCUD attacks (present and future),
- "Technical parity with Saudi jet fighters in perpetuity."[103]

All of this validated the nuclear arsenal in the minds of the Israelis. In particular the confirmed capability of Arab states without a border with Israel, the so-called "second tier" states, to reach out and touch Israel with ballistic missiles confirmed Israel's need for a robust first strike capability.[104] Current military contacts between Israel and India, another nuclear power, bring up questions of nuclear cooperation.[105] Pakistani sources have already voiced concerns over a possible joint Israeli-Indian attack on Pakistan's nuclear facilities.[106] A recent Parameters article speculated on Israel's willingness to furnish nuclear capabilities or assistance to certain states, such as Turkey.[107] A retired Israeli Defense Force Chief of Staff, Lieutenant General Amnon Shahak, has declared, "all methods are acceptable in withholding nuclear capabilities from an Arab state."[108]

As the Israeli bomb comes out of the basement, open discussion, even in Israel, is occurring on why the Israelis feel they need an arsenal not used in at least two if not three wars. Avner Cohen states: "It [Israel] must be in a position to threaten another Hiroshima to prevent another holocaust."[109] In July 1998 Shimon Peres was quoted in the *Jordan Times* as saying, "We have built a nuclear option, not in order to have a Hiroshima, but to have an Oslo,"[110] referring to the peace process.

One list of current reasons for an Israeli nuclear capability is:

- To deter a large conventional attack,
- To deter all levels of unconventional (chemical, biological, nuclear) attacks,
- To preempt enemy nuclear attacks,
- To support conventional preemption against enemy nuclear assets,
- To support conventional preemption against enemy non-nuclear (conventional, chemical, biological) assets,
- For nuclear warfighting,
- The "Samson Option" (last resort destruction).[111]

The most alarming of these is the nuclear warfighting. The Israelis have developed, by several accounts, low yield neutron bombs able to destroy troops with minimal damage to property.[112] In 1990, during the Second Gulf War, an Israeli reserve major general recommended to America that it "use non-contaminating tactical nuclear weapons" against Iraq.[113] Some have speculated that the Israelis will update their nuclear arsenal to "micronukes" and "tinynukes" which would be very useful to attack point targets and other tactical or barrier (mining) uses.[114] These would be very useful for hardened deeply buried command and control facilities and for airfield destruction without exposing Israeli pilots to combat.[115] Authors have made the point that Israeli professional military schools do not teach nuclear tactics and would not use them in the close quarters of Israel. Many Israeli officers have attended American military schools where they learned tactical use in crowded Europe.[116]

However, *Jane's Intelligence Review* has recently reported an Israeli review of nuclear strategy with a shift from tactical nuclear warheads to long range missiles.[117] Israel always has favored the long reach, whether to Argentina for Adolph Eichmann, to Iraq to strike a reactor, Entebbe for hostages, Tunisia to hit the PLO, or by targeting the Soviet Union's cities. An esteemed Israeli military author has speculated that Israel is pursuing an R&D program to provide MIRVs (multiple independent reentry vehicles) on their missiles.[118]

The government of Israel recently ordered three German Dolphin Class 800 submarine, to be delivered in late 1999. Israel will then have a second strike capability with nuclear cruise missiles, and this capability could well change the nuclear arms race in the Middle East.[119] Israeli rhetoric on the new submarines labels them "national deterrent" assets. Projected capabilities include a submarine-launched nuclear missile with a 350-kilometer range.[120] Israel has been working on sea launch capability for missiles since the 1960s.[121] The first basing options for the new second-strike force of nuclear missile capable submarines include Oman, an Arab nation with unofficial Israeli relations, located strategically near Iran.[122] A report indicates that the Israel Defense Ministry has formally gone to the government with a request to authorize a retaliatory nuclear strike if Israel was hit with first strike nuclear weapons. This report comes in the wake of a recent Iran Shihab-3 missile test and indications to Israel that Iran is two to three years from a nuclear warhead.[123] Israeli statements stress that Iran's nuclear potential would be problem to all and would require "American leadership, with serious participation of the G-7 . . . ."[124]

A recent study highlighted Israel's extreme vulnerability to a first strike and an accompanying vulnerability even to a false alarm.[125] Syria's entire defense against Israel seems to rest on chemical weapons and warheads.[126] One scenario involves Syria making a quick incursion into the Golan and then threatening chemical strikes, perhaps with a new, more lethal (protective-mask-penetrable) Russian nerve gas if Israel resists.[127] Their use would drive Israel to nuclear use. Israeli development of an anti- missile defense, the Arrow, a fully fielded (30-50[128]) Jericho II ballistic missile, and the soon-to-arrive strategic submarine force, seems to have produced a coming change in defense force structure. The Israeli newspaper *Ha'aretz*, quotes the Israeli Chief of Staff discussing the establishment of a "strategic command to . .

. prepare an adequate response to the long term threats. . . "[129]

The 1994 accord with Jordan, allowing limited Israeli military presence in Jordanian skies, could make the flying distance to several potential adversaries considerably shorter.[130] Israel is concerned about Iran's desire to obtain nuclear weapons and become a regional leader, coupled with large numbers of Shiite Moslems in southern Lebanon. The Israeli Air Force commanding general issued a statement saying Israel would "consider an attack" if any country gets "close to achieving a nuclear capability."[131] The Israelis are obviously considering actions capable of stopping such programs and are buying aircraft such as the F-15I with sufficient operational range. At the first delivery of these 4,000 kilometer range fighters, the Israeli comment was, "the aircraft would help counter a growing nuclear threat."[132] They consider such regional nation nuclear programs to be a sufficient cause for war. Their record of accomplishment is clear: having hit the early Iraqi nuclear effort, they feel vindicated by Desert Storm. They also feel that only the American and Israeli nuclear weapons kept Iraq's Saddam Hussein from using chemical or biological weapons against Israel.[133]

Israel, like Iran, has desires of regional power. The 1956 alliance with France and Britain might have been a first attempt at regional hegemony. Current debate in the Israeli press considers offering Kuwait, Qatar, Oman, and perhaps Syria (after a peace agreement) an Israeli nuclear umbrella of protection.[134] A nuclear Iran or Iraq might use its nuclear weapons to protect some states in the region, threaten others, and attempt to control oil prices.[135]

Another speculative area concerns Israeli nuclear security and possible misuse. What is the chain of decision and control of Israel's weapons? How susceptible are they to misuse or theft? With no open, frank, public debate on nuclear issues, there has accordingly been no debate or information on existing safeguards. This has led to accusations of "monolithic views and sinister intentions."[1360] Would a right wing military government decide to employ nuclear weapons recklessly? Ariel Sharon, an outspoken proponent of "Greater Israel" was quoted as saying, "Arabs may have the oil, but we have the matches."[137] Could the *Gush Emunim*, a right wing religious organization, or others, hijack a nuclear device to "liberate" the Temple Mount for the building of the third temple? Chances are small but could increase as radicals decry the peace process.[138] A 1997 article reviewing the Israeli Defense Force repeatedly stressed the possibilities of, and the need to guard against, a religious, right wing military coup, especially as the proportion of religious in the military increases.[139]

Israel is a nation with a state religion, but its top leaders are not religious Jews. The intricacies of Jewish religious politics and rabbinical law do affect their politics and decision processes. In Jewish law, there are two types of war, one obligatory and mandatory *(milkhemet mitzvah)* and the one authorized but optional *(milkhemet reshut)*.[140] The labeling of Prime Minister Begin's "Peace for Galilee" operation as a *milchemet brera* ("war of choice") was one of the factors causing it to lose support.[141] Interpretation of Jewish law concerning nuclear weapons does not permit their use for mutual assured destruction. However, it does allow possession and threatening their use, even if actual use is not justifiable under the law. Interpretations of the law allow tactical use on the battlefield, but only after warning the enemy and attempting to make peace. How much these intricacies affect Israeli nuclear strategy decisions is unknown.[142]

The secret nature of the Israeli nuclear program has hidden the increasing problems of the aging Dimona reactor and adverse worker health effects. Information is only now public as former workers sue the government. This issue is now linked to continued tritium production for the boosted anti-tank and anti-missile nuclear warheads that Israeli continues to need. Israel is attempting to obtain a new, more efficient, tritium production technology developed in India.[143]

One other purpose of Israeli nuclear weapons, not often stated, but obvious, is their "use" on the United States. America does not want Israel's nuclear profile raised.[144] They have been used in the past to ensure America does not desert Israel under increased Arab, or oil embargo, pressure and have forced the United States to support Israeli diplomatically against the Soviet Union. Israel used their existence to guarantee a continuing supply of American conventional weapons, a policy likely to continue.[145]

Regardless of the true types and numbers (see Appendix A) of Israeli nuclear weapons, they have developed a sophisticated system, by myriad methods, and are a nuclear power to be reckoned with. Their nuclear ambiguity has served their purposes well but Israel is entering a different phase of visibility even as their nuclear capability is entering a new phase. This new visibility may not be in America's interest.[146] Many are predicting the Israeli nuclear arsenal will become less useful "out of the basement" and possibly spur a regional arms race. If so, Israel has a 5-10 year lead time at present before mutual assured destruction, Middle East style, will set in. Would regional mutual second strike capability, easier to acquire than superpower mutual second strike capability, result in regional stability? Some think so.[147] Current Israeli President Ezer Weizman has stated "the nuclear issue is gaining momentum [and the] next war will not be conventional.[148]

Appendix A

Estimates of the Israeli Nuclear Arsenal

1967: 13 bombs [149]
2 bombs [150]

1969: 5-6 bombs of 19 kilotons yield each [151]

1973: 13 bombs [152]
20 nuclear missiles and have developed a "suitcase bomb" [153]

1974: 3 nuclear capable artillery battalions each with 12 175mm
tubes & a total of 108 warheads [154]
10 bombs [155]

1976: 10-20 nuclear weapons [156]

1980: 200 bombs [157]

1984: 12-31 atomic bombs [158]
31 plutonium bombs and 10 uranium bombs [159]

1985: at least 100 nuclear bombs [160]

1986: 100-200 fission bombs and a number of fusion bombs [161]

1991: 50-60 to 200-300 [162]

1992: >200 bombs [163]

1994: 64-112 bombs (@ 5 kg/warhead) [164]
50 nuclear tipped Jericho missiles, 200 total [165]

1995: 66-116 bombs (@ 5 kg/warhead) [166]
70-80 weapons [167]
"A complete repertoire" (neutron bombs, nuclear mines,
suitcase bombs, submarine borne) [168]

1996: 60-80 Plutonium weapons, maybe >100 assembles, ER variants,
variable yields [169]
Possibly 200-300 [170]
50-90 Plutonium weapons, could have well over 135. 50-100
Jericho I and 30-50 Jericho II missiles. [171]

1997: >400 deliverable thermonuclear and nuclear weapons [172]

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